

UNIVERSITY OF SASKATCHEWAN

GENERAL ENGINEERING 226.3

(Mechanics III)

Mid-Term Examination

A CLOSED BOOK EXAMINATION

(Examiners: A.T. Dolovich and E.J. Llewellyn)

Date: February 10, 2005.

Time: 1.5 hours.

Marks: 60 (All questions have equal value)

INSTRUCTIONS

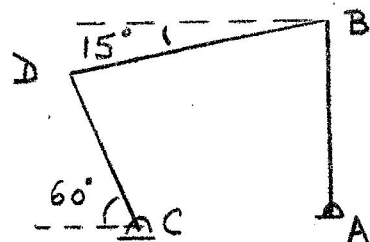
The examination consists of 3 questions.

Candidates should answer ALL three questions.

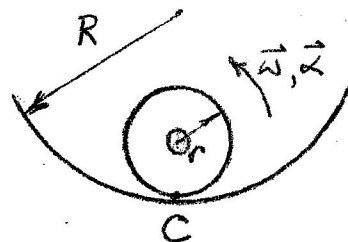
Electronic calculators are permitted.

1. In the shown link system rod AB rotates at 3 rad/s in a counter clockwise sense. Determine the angular velocity of rod CD and the velocity of point D.

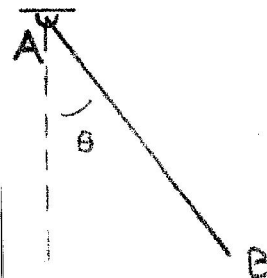
$$\begin{aligned} AB &= 0.5 \text{ m} \\ BD &= 0.7 \text{ m} \\ CD &= 0.5 \text{ m} \end{aligned}$$



2. The small cylinder, with radius r and center at O, rolls on the large concave surface, radius R , without slipping. The cylinder has an angular velocity ω and an angular acceleration α as shown in the figure. What is the acceleration of the point C on the cylinder that is in contact with the concave surface?



3. The uniform slender bar AB has a mass of 8kg and swings freely in a vertical plane about the pivot at A. What is the angular acceleration of the bar and the force supported by the pivot at A at the instant when $\theta = 30^\circ$ and $\dot{\theta} = 2 \text{ rad/sec}$? The moment of inertia of the rod about its centre of mass is $m\ell^2/12$.



$$AB = 1.5 \text{ m}$$